

**THE UNITED STATES PATENT APPLICATION**

**OF**

**YONG GYU KIM**

**FOR**

**METHOD OF MOUNTING LIQUID CRYSTAL**

**DISPLAY MODULE AND APPARATUS THEREOF**

**LONG ALDRIDGE & NORMAN L.L.P.**  
**701 Pennsylvania Avenue, N.W.**  
**Sixth Floor, Suite 600**  
**Washington, D.C. 20004**  
**Telephone No.: (202) 624-1200**  
**Facsimile No.: (202) 624-1298**

This application claims the benefit of Korean Patent Application No. 97-20550, filed in Korea on May 24, 1997, which is hereby incorporated by reference.

## **BACKGROUND OF THE INVENTION**

### **Field of the Invention**

5           The present invention relates to a computer having a liquid crystal display module, and more particularly, to a method of mounting a liquid crystal display module in a computer such as a notebook personal computer (hereinafter referred to as "NTPC").

### **Description of the Related Art**

10           Generally, a conventional NTPC is manufactured having a size that allows a user to exploit information in the course of his travels. In such an NTPC, a liquid crystal display (LCD) module is used as the display device for displaying the information. The liquid crystal display module has to be protected from being damaged when moving the computer system including the LCD module and a keyboard. Also, the LCD module has to be secured to a sash (or moveable frame) so it may be opened at time of use. To this end, the liquid crystal  
15           display module was provided at a bottom surface or an inner surface such that it overlapped with the keyboard installed on a top surface or an inner surface, or that it is opened for a user together with the keyboard, as the upper sash pivots with respect to one side of the lower sash.

20           Fig. 1 is a front view of a conventional notebook personal computer and Fig. 2 is a side view of the conventional notebook personal computer. Referring to Figs. 1 and 2, in the conventional NTPC, a liquid crystal display module and an upper sash 12 are pivotally secured to a lower sash 10 by a hinge 20 as shown in Fig. 1. A protection rod 14a is defined

in the edge of the liquid crystal display module 14, and a support piece 14b is defined in the protection rod 14a. This support piece 14b is secured to the bottom surface or inner surface of the upper sash 12 by means of screws 22, thereby supporting the liquid crystal display module 14 in such a manner that it is not removed.

5           Meanwhile, the hinge 20 pivotally couples an arm 18 with one end of a fixed rod 16. This fixed rod 16 is secured to the inner side, that is, to the rear wall of the lower sash 10 by means of the screws 22. The arm 18 is secured to the bottom surface or inner surface of the upper sash 12 by means of the screws 22, thereby supporting the liquid crystal display module 14 and the upper sash 12 in such a manner that they pivot with respect to the upper  
10       end of the rear wall of the upper sash 10. Further, an arm 16 is formed in the shape of an "F" such that it can sufficiently bear the load of the upper sash 12, that is, it makes good contact with the bottom surface of the upper sash 12.

          In the conventional NTPC, as described above, the hinge 20 and the liquid crystal display module 14 are secured to the bottom surface of the upper sash 12 separately. This  
15       brings about a complication in the manufacturing process. Also, since the arm occupies a great area in the upper sash, the available area of the display portion, that is, the liquid crystal display module, becomes small. This increases the dimension of the NTPC.

### **SUMMARY OF THE INVENTION**

          Accordingly, the present invention is directed to a method of mounting a liquid crystal  
20       display module and an apparatus thereof that substantially obviates one or more of the problems due to limitations and disadvantages of the related art.

An object of the present invention is to provide a method of mounting a liquid crystal display module and an apparatus thereof that can minimize a manufacturing process of the NTPC.

Another object of the present invention is to provide a method of mounting a liquid  
5 crystal display module and an apparatus thereof that can minimize the dimension of NTPC.

Additional features and advantages of the invention will be set forth in the description which follows, and in part will be apparent from the description, or may be learned by practice of the invention. The objectives and other advantages of the invention will be realized and attained by the structure particularly pointed out in the written description and  
10 claims hereof as well as the appended drawings.

To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described, a method of mounting a liquid crystal display module in a computer having an upper sash, a lower sash, and a fixed rod coupling the upper sash to the lower sash, the upper sash including the liquid crystal display module, a  
15 hinge coupled to the fixed rod, and an arm coupled to the hinge, comprises the steps of arranging the arm, coupled to one end of the fixed rod through the hinge in the upper sash, to be positioned between a side wall of the upper sash and a side wall of the liquid crystal display module; and fastening together the side wall of the upper sash and the side wall of the liquid crystal display module through the arm.

20 In another aspect of the present invention, a mounting apparatus of a liquid crystal display module in a computer including an upper sash secured pivotally to a lower sash thereof, the liquid crystal display module being installed in the upper sash, comprises a fixed rod secured to an inner side of the lower sash; a hinge coupled to the fixed rod; an arm

coupled pivotally to one end of the fixed rod through the hinge; and a screw securing the upper sash and the liquid crystal display module through the arm.

In another aspect of the present invention, a method of mounting a liquid crystal model comprises the steps of arranging an arm coupled with one end of a fixed rod by a hinge  
5 in such a manner that it is disposed between a side wall of the upper sash and a side wall of the liquid crystal display module, and going through a screw from the side wall of the upper sash to the side wall of the liquid crystal display module by way of the arm.

In a further aspect of the present invention, a mounting apparatus of a liquid crystal display module in a notebook personal computer which includes an upper sash secured  
10 pivotally to a lower sash thereof and an liquid crystal module installed to the upper sash, comprises a fixed rod secured to the inner side of the lower sash, and an arm coupled pivotally with one end of the fixed rod by a hinge, and secured to a side wall of the upper sash by a screw along with the liquid crystal display module.

It is to be understood that both the foregoing general description and the following  
15 detailed description are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate  
20 embodiments of the invention and together with the description serve to explain the principles of the invention.

In the drawings:

Fig. 1 is a front section view of the conventional notebook personal computer;

Fig. 2 is a side section view of the conventional notebook personal computer;

Fig. 3 is a front section view of a notebook personal computer according to an embodiment of the present invention; and

5 Fig. 4 is a side section view of a notebook personal computer according to an embodiment of the present invention.

### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

10 Fig. 3 is a front section view of an NTPC employing a mounting apparatus for a liquid crystal display module according to an embodiment of the present invention, and Fig. 4 is a side section view of an NTPC employing a mounting apparatus for a liquid crystal display module according to an embodiment of the present invention.

Referring to Figs. 3 and 4, the NTPC includes an upper sash 32 pivotally secured to a lower sash 30 by a hinge 40. This upper sash 32 is provided with a liquid crystal display module 34, and the edges or side walls of the liquid crystal display module 34, are provided with a protection rod 34a. The upper sash 32 has a rectangular plastic plate 32a, side walls 32b extending perpendicularly from the plastic plate 32a, a front wall not shown, and a rear wall 32c. Further, there is provided a blade 32d extending in parallel with the plastic plate 32a or extending with a slant toward the plastic plate 32a, in the upper ends of these walls, that is, the side walls 32b, front wall, and rear wall 32c.

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Meanwhile, the hinge 40 pivotally couples an arm 38 with one end of a fixed rod 36. This fixed rod 36 goes through a hole, not shown, defined from a middle position of the rear wall 32c of the uppers sash 32 to the end position of the blade 32d and a hole, not shown, defined from the rear side end of the upper plate of the lower sash 30, and then extends to the inner side of the lower sash 30. Further another side of the fixed rod 36 is secured to the inner face of the rear wall of the lower sash 30 by means of screws 42. The arm 38 is formed in such a manner that it extends from the hinge 40 by a length of the side face of the liquid crystal display module 34. The arm 38 also opposes the protection rod 34a and the side wall 32b of the upper sash 32. Thus, the arm 38 is secured by the screw 42 to be positioned between the protection rod 34a and the side wall 32b of the upper sash 32. At this time, the screw 42 passes through the side wall 32b of the upper sash 32 and the arm 38 and then reaches a middle position of the protection rod 34a, thereby coupling both of the liquid crystal display module 34 and the arm 38 with the upper sash 32. Accordingly, both of the upper sash 32 and the liquid crystal module 34 pivots with respect to the rear side edge of the lower sash 30 along with the arm 38. Also, an occupied area of the arm 38 at the upper sash 32 is reduced. In addition, although the hinge is disposed at the inner side of the upper sash 32 in the present embodiment, it may be disposed at the lower sash 30 for the sake of reducing the size of the upper sash 32.

As described above, according to an liquid crystal display module mounting apparatus of the present invention, it is possible to reduce a manufacturing process of the NTPC by securing the arm and the liquid crystal display module to the side wall of the upper sash. Also, the liquid crystal display module mounting apparatus of the present invention can increase the available area of the display portion as well as a reduction in the dimension of NTPC.

It will be apparent to those skilled in the art that various modifications and variations can be made in the method of mounting liquid crystal display module and apparatus thereof of the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

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